Manual Supplement

Model Number: **8680-N2**

Product/System Title: **Room Pressure AOC Controller with N2 Communications Protocol**

Contents of this manual supplement include:

1) Sequence of Operation
2) Variable map
3) Description of software items added
4) Software items deleted
5) Description of variables
6) Wiring Diagram

N2 communications are installed on the Model 8680-N2 room pressure controllers. This document provides the technical information needed for the host DDC system to communicate with 8680-N2 units. This document assumes the programmer is familiar with the N2 protocol. Further technical assistance is available from TSI if your question is related to TSI interfacing to a DDC system. If you need further information regarding N2 programming in general, please contact Johnson Controls.

Sequence of Operation

The Model 8680-N2 measures the room pressure differential and receives temperature information from the thermostat. The 8680-N2 control algorithm modulates the supply and general exhaust air to provide adequate supply air while maintaining the room pressure differential and temperature control.

Temperature control is provided by a thermostat that provides temperature information to the Model 8680-N2 controller and controls the reheat coil. The thermostat will provide a 0-10V signal, corresponding to a 50-85°F temperature. Alternatively, the temperature can be sent to the controller over the N2 bus (Analog Input #3)

In occupied mode, the Model 8680-N2 has two supply flow set points: ventilation and temperature. The ventilation setpoint is the minimum supply flow for the space, used when the heating and cooling loads are met. The temperature supply set point is a higher flow, required to meet an increased cooling load in the lab.

Laboratory temperature is continuously transmitted to the Model 8680-N2. When the laboratory temperature is satisfied, the ventilation set point is maintained, unless additional supply air is required for the room pressure balance. When the space temperature is more than 1°F above the temperature setpoint, the 8680-N2 slowly will increase the supply air volume, to a maximum of the temperature minimum supply flow, until the space temperature returns to setpoint. When the space temperature is more than 1°F below the temperature setpoint, the 8680-N2 slowly will decrease the supply air volume, to a minimum of the ventilation minimum supply flow, until the space temperature returns to setpoint. If the supply volume is at the ventilation minimum supply flow, the thermostat will modulate the reheat valve to provide the necessary heating.

In unoccupied mode, the supply flow will remain at the unoccupied supply flow rate.

Supply air volumes will rise above the minimum setpoints, under all conditions, as required to maintain space pressurization. Temperature control and occupied/unoccupied modes will only affect the minimum supply flows, which are used, for example, when fume hood sashes are lowered.

NOTE: The 8680-N2 will not allow the temperature minimum supply volume to be less than the ventilation minimum supply volume

Description of New Software Items

The Model 8680-N2 has new/different software items which optimize the unit for N2. The new software items are located in various menus as shown in the attached Menu Structure drawing.

Item	Description
TEMP SETP	The **TEMP SETP** item is the setpoint temperature of the space. If the actual temperature is more than 1°F below the setpoint, the 8680-N2 will slowly decrease the minimum supply flow setpoint until it is at the ventilation minimum, at which point the reheat coil will have to be energized (by others). If the temperature is more than 1°F above the temperature setpoint, then the 8680-N2 will slowly increase the minimum supply flow setpoint, until the supply flow is at the temperature minimum setpoint.
TEMP CAL	The **TEMP CAL** item is used to calibrate the temperature signal from the thermostat to the proper temperature. To calibrate the temperature signal, enter the **TEMP CAL** menu item, and use the ♦ and ♦ keys to adjust the displayed temperature until it matches the actual temperature. Then, press the SELECT key to save the new calibration.
XDCR OUT	The **XDCR OUT** menu item allows the user to select the maximum range of the pressure transducer. The values are 0.1, 0.2, 0.3, 0.4, and 0.5 inches H2O (25, 50, 75, 100, 125 pascals). The default value is 0.5 inches H2O (125 pascals). This menu item is found in the **HOOD FLOW**, **EXHAUST FLOW**, and **SUPPLY FLOW** menus.

Menu Configuration

SETPOINTS	ALARM	CONFIGURE	CALIBRATION
SETPOINT	LOW ALARM	DISPLAY AVG	SENSOR ZERO
VENT MIN SET	HIGH ALARM	UNITS	SENSOR SPAN
COOLING FLOW	MIN SUP ALM	EXH CONFIG	ELEVATION
UNOCCUPY SET	ALARM RESET	ACCESS CODES	**TEMP CAL**
MIN EXH SET	AUDIBLE ALM		
TEMP SETP	ALARM DELAY		
MIN OFFSET	ALARM RELAY		
MAX OFFSET	MUTE TIMEOUT		

CONTROL	SYSTEM FLOW	FLOW CHECK	DIAGNOSTICS
SPEED	TOT SUP FLOW	HD1 FLOW IN	CONTROL SUP
SENSITIVITY	TOT EXH FLOW	EX1 FLOW IN	CONTROL EXH
CONTROL SIG	OFFSET VALUE	SP1 FLOW IN	SENSOR INPUT
Kc VALUE	SUP SETPOINT		SENSOR STAT
Ti VALUE	EXH SETPOINT		SUP FLOW IN
Kc OFFSET			TEMP INPUT
			LOW ALM REL
			HIGH ALM REL

INTERFACE	HOOD FLOW	EXHAUST FLOW	SUPPLY FLOW
NET ADDRESS	HD1 DCT AREA	EX1 DCT AREA	SP1 DCT AREA
	HD1 FLO ZERO	EX1 FLO ZERO	SP1 FLO ZERO
	FLO STA TYPE	FLO STA TYPE	FLO STA TYPE
	XDCR OUT	XDCR OUT	XDCR OUT
	TOP VELOCITY	TOP VELOCITY	TOP VELOCITY

Software Items Deleted

The following software items have been deleted from the 8680-N2:

Menu	Item
SETPOINTS	**MAX SUPPLY SET**
	TEMP LOW
	TEMP HIGH
ALARM	**MIN EXH ALARM**
CONFIGURE	**ROOM VOLUME**
SYSTEM FLOW	**ACPH**
INTERFACE	**NET PROTOCOL**

Variable Map

NPT	NPA	UNITS[1]	DESCRIPTION	
AI	1	ft/min, m/s, in. H_2O, Pa, mm H_2O	Room Pressure Value	
AI	2	CFM, l/s	Current Offset Value	
AI	3	°F, °C	Temperature	
AI	4	CFM, l/s	Minimum Supply Setpoint	
AI	5	CFM, l/s	Hood Exhaust Flow Value	
AI	6	CFM, l/s	Auxiliary Exhaust Flow Value	
AI	7	CFM, l/s	Supply Flow Value	
AI	8	CFM, l/s	Total Exhaust Flow Value	
AI	9	% OPEN	Supply Control Output	
AI	10	% OPEN	Exhaust Control Output	
BI	1		Low Room Pressure Alarm	0=Normal 1=Low Alarm
BI	2		High Room Pressure Alarm	0=Normal 1=High Alarm
BI	3		Min. Supply Flow Alarm	0=Normal 1=Low Flow Alarm
BI	4		Emergency Mode	0=Normal 1=Emergency Mode
BI	5		Occupied/Unoccupied Mode	0=Occupied 1=Unoccupied
BI	6		Data Error	0=Normal 1=Data Error
AO	1	ft/min, m/s, in. H_2O, Pa, mm H_2O	Room Pressure Setpoint	
AO	2	ft/min, m/s, in. H_2O, Pa, mm H_2O	Low Alarm Setpoint	
AO	3	ft/min, m/s, in. H_2O, Pa, mm H_2O	High Alarm Setpoint	
AO	4	CFM, l/s	Min. Supply Alarm Flow Alarm Setpoint	
AO	5	CFM, l/s	Minimum Ventilation Rate Supply Flow Setpoint	
AO	6	CFM, l/s	Supply Cooling Flow Setpoint	
AO	7	CFM, l/s	Unoccupied Mode Minimum Supply Flow Setpoint	
AO	8	CFM, l/s	Minimum Offset Setpoint	
AO	9	CFM, l/s	Maximum Offset Setpoint	

NPT	NPA	UNITS[1]	DESCRIPTION	
AO	10	CFM, l/s	Minimum Exhaust Flow Setpoint	
AO	11	°F, °C	Temperature Setpoint	
AO	12	#	Units	0=Feet per minute 1=Meters per second 2=Inches of H_2O 3=Pascals 4=millimeters of H_2O

[1] Units will correspond with choice in UNITS variable (AO #12). Flow rates will either be CFM or l/s, based on whether UNITS variable is set for an english or metric unit type.

Description of Variables

NPT - Network Point Type
Variables are defined as analog inputs, binary inputs, and analog outputs. Analog inputs are current control parameters and items that the controller is measuring. Binary inputs represent controller states. Analog outputs are the programmable setpoints for the isolation room pressure controller and monitor. These setpoints can be changed through the keypad or by overriding the current setpoint.

NPA - Network Point Address
Address of the desired point.

Change of Status (COS) - Room Pressure Analog Input
The 8680-N2 has the ability to change control setpoints locally. The alarm setpoints need to be based on the controller's control setpoint (AO #1). For example the setpoint could go from -0.002 "H_2O to +0.001 "H_2O. If the COS alarm setpoints are not changed to accommodate you could get low alarm or low warning messages when the unit is working correctly. If these alarm points are set outside of the setpoint values, incorrect alarm messages can be prevented.

Override Analog Input Command
Analog Input values can be set using the override command. These values will be reset to the correct items when the Override is released. There is not a time-out on the override command.

Override Binary Input Command
Overriding a 1 to Emergency binary inputs enables that mode. To release the controller from emergency state, override a 0 to the Emergency input or press either the emergency or reset key. Releasing the override will return the controller to the Normal state. If the 8680-N2 had been put into Emergency mode from the keypad, then it cannot be cleared remotely.

Overriding a 1 to the Occupied/Unoccupied Mode binary inputs enables the unoccupied mode. To release the controller from the unoccupied state, override a 0 to the Occupied/Unoccupied Mode. Pressing the AUX key will also toggle the unit between Occupied and Unoccupied Modes.

The alarm and data error variables can be overridden, but this will not affect the controller. Overriding the low alarm variable will result in a change of status, but will not put the controller into low alarm mode. The local alarm modes can only be controlled locally. Only override these variables for diagnostic purposes, and release them for normal operation.

Binary Input Data Error
Data Error binary inputs are used to indicate if something has gone wrong with the controller. Data Error indicates when some of the data stored on the device has been corrupted. The calibration and setpoint values should be checked on the controller.

Override Analog Output Command

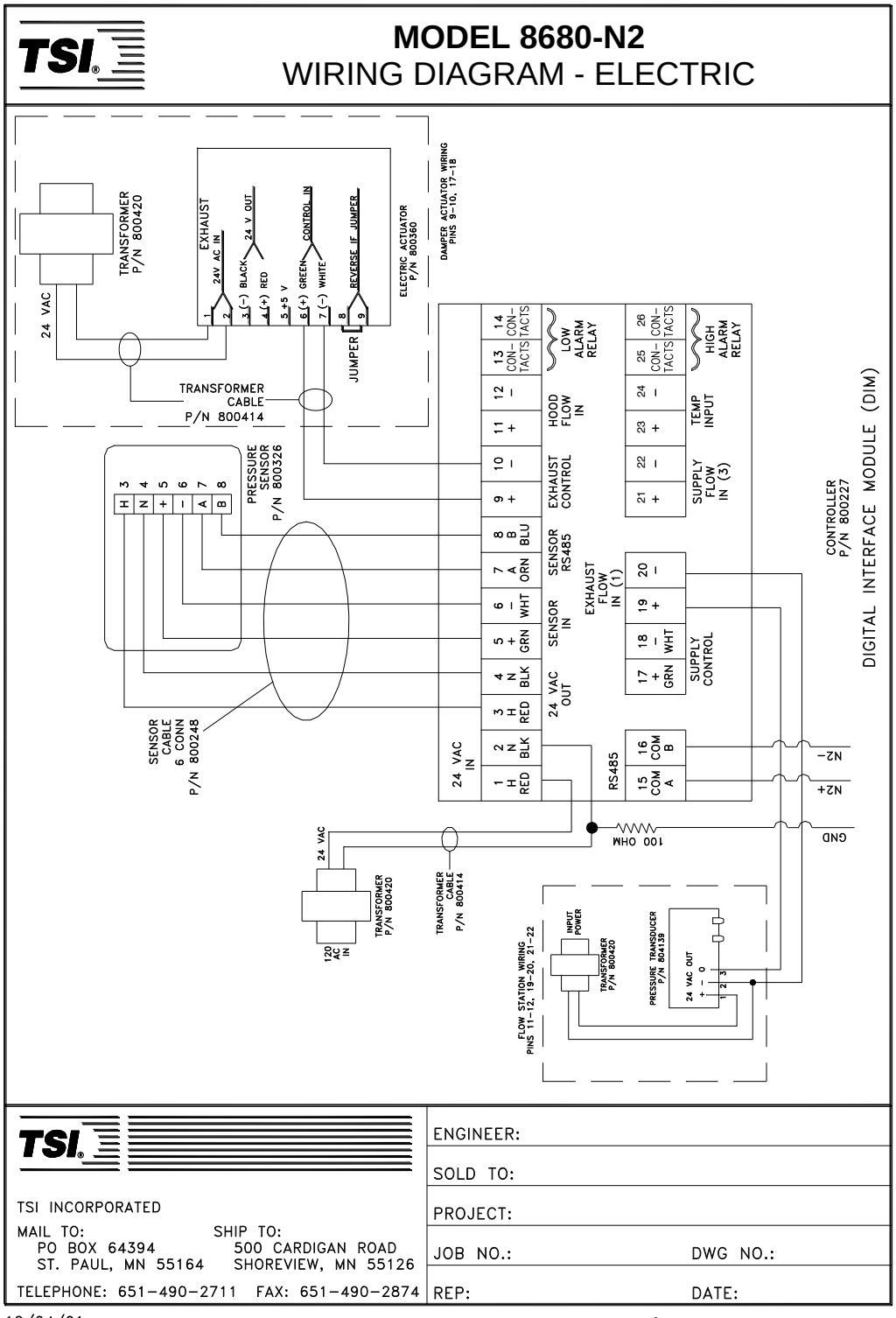
The analog output variables can be overridden to change their values. The overridden value will be checked for validity. If invalid, the override command will be ignored, and the value will not change. The override flag will not be set when the value is ignored. The override command will be cleared when the variable is reset in the menus. The variable will not reset with the release command.

Supported Commands

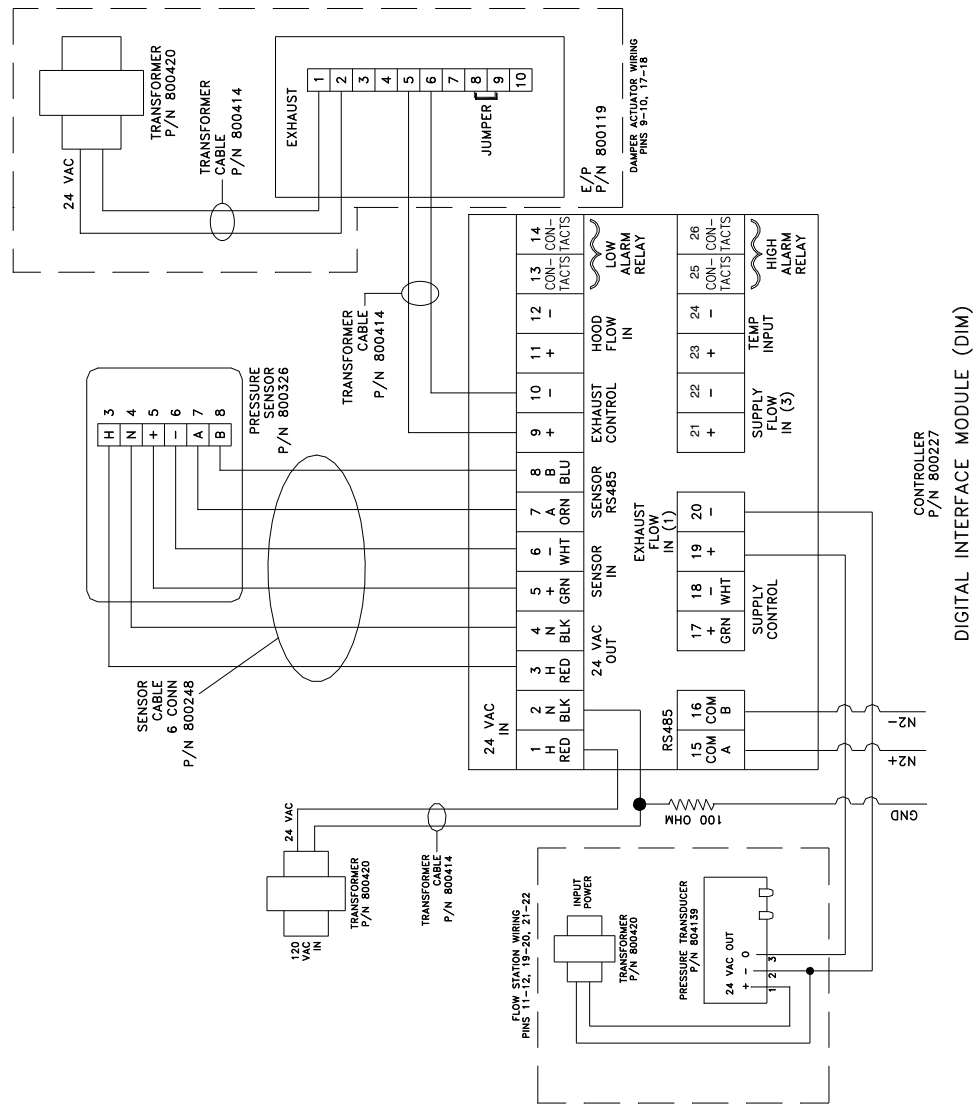
Command	Response
Request Device ID	Returns 0x10
Synchronize Time Command	Acknowledged. There Is No Internal Clock To Synchronize.
Poll Without/With Ack Message	Any Change Of Status Is Returned
Read Analog Input Command	Variable Value
Read Binary Input Command	Variable Value
Read Analog Output Command	Variable Value
Write Analog Input	Acknowledge
Write Binary Input	Acknowledge
Write Analog Output	Acknowledge
Override Analog Input Command	Acknowledge
Override Binary Input Command	Acknowledge
Override Analog Output Command	Acknowledge
Override Release Request	Acknowledge
Identify Device Type Command	Returns 0x10h

Note: Poll Without/With Ack Message will need to be sent twice in order to receive all of the possible change of status variables.

Wiring Diagram



MODEL 8680-N2
WIRING DIAGRAM - PNEUMATIC



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